Effect of a Pay-As-You-Drive charge on the adoption of lower carbon vehicles

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It is now becoming clear that the ACEA voluntary agreement for reducing CO_2 emissions from new cars to 140g/km by 2008 is unlikely to be met. Beyond this, delivering a target of 120g/km by 2012 also looks improbable. As pressure for mandatory regulation grows, for a limited time there remains an opportunity to increase the effectiveness of existing consumer price signals to encourage the adoption of lower carbon vehicles.

This study uses a new approach to designing an effective low carbon taxation regime with the aim of persuading UK consumers to purchase more fuel-efficient and low-carbon cars (defined as $\leq 100gCO_2/km$). This approach starts by identifying the most accessible attitudinal levers with which to modify (automotive) consumer behaviour. This achieved, a taxation system is then devised to influence attitudes and behaviour to maximum effect. In this way, the 'attitude-action' gap is bridged, exploiting the most efficient links between tax policy, consumer attitudes, car purchasing behaviour and carbon impact.

By focusing on (private car) consumer understanding, knowledge and reception of price signals, the research investigates the effect of transferring 50% of the Fuel Excise Duty (FED) tax burden to a new graduated Pay-As-You-Drive (PAYD) distance charge based on vehicle CO_2 emissions, replacing the existing 'A' to 'G' graduated Vehicle Excise Duty (VED). In addition, the distance charge differentials are re-scaled such that lower carbon cars pay less per mile that they do under the current tax system (higher carbon cars are charged proportionately more).

The results of modelling changes in consumer behaviour indicate that by introducing a PAYD charge based on an annual cost gradient of £10 (€15/$18) for each additional vehicle gCO_2/km, consumers increasingly opt to purchase lower carbon cars such that total annual carbon emissions are reduced by 0.3-0.5 MtC, and the proportion of Band 'A' cars increases by an additional 2.2%. This corresponds to an increase of £1375 (€2016/$2520) in the annual variable cost differential between the least and most polluting units. With a PAYD charge based on an annual cost gradient of £14 (€21/$26) for each additional gCO_2/km, total annual carbon emissions are reduced by 0.6-1.0 MtC, and the proportion of Band 'A' cars increases by 6.2%. This corresponds to an increase in the maximum annual variable cost differential of £1925 (€2823/$3529).

Interestingly, both scenarios only lead to a marginal reduction in mobility (1%-2%) as measured by total car miles travelled. The interpretation is that private motorists continue to drive to the same extent as under the existing system, but do so in more fuel-efficient (lower carbon) cars. The modelling also predicts an increase in annual UK road taxation revenue of £4.4-£7.8 billion (€6.5-€11.4/$8.1-$14.3 billion), which, the authors suggest, could be used to purchase carbon-offsets and/or fund capital grants for Band A cars, so reinforcing the PAYD scheme. The research does not model possible secondary effects of changes in driving habits resulting from the increased transparency of motoring costs, but the extension of these types of elastic effects would be straightforward to include in future work.

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